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The Bureau of Weights and Measures of the United States Coast and Geodetic Survey has provisionally adopted the value .393700. If this value were assumed instead of CLARKE'S some of the metric equivalents on pages 146–8 would have slightly different values. W. J. HUSSEY.

STANFORD UNIVERSITY, 1894, November 19.

THE CHEMICAL CONSTITUTION OF *MARS'* ATMOSPHERE,

BY DR. HENRY H. BATES.

[The following private letter from one of the members of the Society is interesting; and especially so if read in connection with the article by Professor CAMPBELL (*Concerning an Atmosphere on Mars*), printed in this number of the *Publications*. It is proper to say that the conclusions which Dr. BATES has independently reached have been suggested and discussed by others. Professor SCHIAPARELLI, Mr. A. COWPER RANYARD and others have printed papers or paragraphs on the subject; and the general question of a substitute of other chemical compounds for water has been considered for some time past in the LICK Observatory. E. S. H.]

"PROFESSOR E. S. HOLDEN, Director LICK Observatory.

"I was very much impressed with the * * * paper by Mr. CAMPBELL on the spectrum of *Mars*, reported in No. 37 of the *Publications* A. S. P. This * * * seems to entirely negative former impressions as to evidence of aqueous vapor on *Mars*. Mr. CAMPBELL himself seems to have worked under a foregone conclusion opposed to his proofs, which makes his work all the more trustworthy. It is a remark at the close of his paper that I wish to question. He considers, with many others, that 'the polar caps on *Mars* are conclusive evidence of an atmosphere *and aqueous vapor*.' Is not this putting it very strongly in the absence of all positive evidence and in the face of the powerful adverse negative evidence? The only reason for believing in the presence of aqueous vapor on *Mars*, is the waxing and waning of the white polar caps under the Sun's apparent influence, in analogy with those of our planet.

"But why assume snow or ice? It seems incredible from *Mars'* small size and great distance from the Sun, and relatively scant atmosphere, that it can have sufficient contained heat, or can receive sufficient heat from any source to liquefy ice, even if it ever had an aqueous atmosphere. The amount of solar heat received is calculable and is insufficient. The temperature of *Mars* at the poles cannot be much above absolute zero point. It is chilled to the center and is cracked through and through in many directions, as the immense cañons, absurdly called canals, evince. So much so, that it would probably go to pieces on any unusual gravitative-deforming stress, like its outer neighbor whose wreck formed the debris of the asteroids. There is no reason to suppose that white caps necessarily imply ice. I consider that instead of oxide of hydrogen these caps are more likely composed of carbon dioxide, or at least some oxide or salt whose solid state and liquid and gaseous states are more in accord with the actual temperature conditions of *Mars*. Caps of snow-like carbonic acid would wax and wane under the very small accession of heat possible on *Mars*, precisely as do snow caps under our much higher temperature conditions. From this might result the floods of liquid carbon dioxide, which appear to fill the cañons and low places in variable amount, and might also be the source of a low and dense atmosphere of carbonic acid vapor, sufficient to explain the atmospheric indications perceived on *Mars*, especially the refractive duplication of the cañon lines.

"Another consideration negatives the antecedent probability of the existence of watery vapor on *Mars*. The mass of *Mars* is quite too small to have retained a gaseous envelope constituted like our atmosphere—certainly so far as regards free hydrogen, and probably also free oxygen, as shown by the late J. G. STONEY. The constituents of water therefore being *ab origine* absent, the presence of water cannot be predicated, unless we imagine oceans of aqueous substance (hail) wandering in space ready-made to be precipitated upon convenient planets, which is too violent a supposition.

"*Mars* is no doubt in a more senile and decrepit condition than our Moon. The Moon indeed is entirely dead, but it is not *cracked* and ready for disintegration apparently. It long had a considerable thermal retarding influence in its near companion, the Earth. *Mars*, though larger, is far worse off, from its long isolation, though from this very fact *Mars*, unlike the Moon, could have retained some atmosphere of heavy, dead and dense gases enough to account for the observed phenomenon of white precipitation at the points of absolute cold. It is for observers to identify this substance chemically. I should wish very much that * * * Mr. CAMPBELL would try for spectroscopic indications of carbon lines, or lines of any other haloid that solidifies only at extremely low temperatures and becomes liquid and gaseous at such temperatures as might reasonably be looked for on *Mars*. I am very sincerely yours,

HENRY H. BATES."

WASHINGTON, D. C., September 8, 1894.

ORBIT OF COMET *e*, 1894 (E. D. SWIFT, NOVEMBER 20). BY PROFESSOR A. O. LEUSCHNER.

From three observations by Professor BARNARD at Mount Hamilton, I have computed the following parabolic elements :

Perihelion passage,	1894, Oct. 4.9009, Berlin Mean Time.
Longitude Node,	43° 4′ 17″
Longitude Perihelion,	334° 52′ 44″
Inclination,	3° 16′ 13″
Perihelion distance,	1.4703.

DEPARTMENT OF ASTRONOMY,
UNIVERSITY OF CALIFORNIA, BERKELEY, Nov. 28, 1894.

DISCOVERY OF COMET *e*, 1894 (SWIFT).

Mr. E. D. SWIFT telegraphs from the LOWE Observatory, Echo Mountain, California, that he discovered an unexpected comet on November 20, at $8^h 30^m$ ($16^h 30^m$, G. M. T.)

E. S. H.

BRIGHT PROMINENCES ON THE TERMINATOR OF *MARS*, SEEN AFTER OPPOSITION.

The first bright prominence on the terminator of *Mars* to be seen after opposition, appeared November 20, and was seen by Professor SCHAEBERLE. E. S. H.

THE ECLIPSE COMET OF APRIL, 1893.

The *Observatory* for November, 1894, contains an important note by Mr. W. H. WESLEY, Assistant Secretary of the Royal Astronomical Society, in which he gives measures (and diagrams) of the eclipse comet as shown on the negatives of the British expeditions to Brazil and Africa. These independent measures by Mr. WESLEY on the originals agree substantially with the measures made by Professor SCHAEBERLE on the copies furnished to the LICK Observatory. E. S. H.

LICK OBSERVATORY, November 16, 1894.

DECORATION FOR PROFESSOR HOLDEN.

The Secretary of State of Saxe-Meinigen has transmitted to the Director of the LICK Observatory the diploma and cross of Commander of the Saxe-Ernestine Order, II Class. This order was founded in 1690 and reorganized in 1833, and is given in recognition of distinguished service in high official positions, either military or civil.

ERRATUM.

In these *Publications*, Vol. VI, No. 37, page 194, line 20, for "crosses the equator" read "reaches the solstice." M. M.